RESULTS OF THE HARVARD-ADELAIDE UNIVERSITIES ANTHROPOLOGICAL EXPEDITION, 1938-39

ANALYSIS OF AN AUSTRALIAN ABORIGINAL'S HOARD OF KNAPPED FLINT

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The following is a contribution to the results of the Harvard-Adelaide Universities Anthropological Expedition of 1938-39, which was made possible by a generous grant from the Carnegie Corporation of New York.

The 74 pieces (A. 27556 in the South Australian Museum) of light brown and grey flint dealt with in this analysis were found in June 1939 by D. M. Tindale on an aboriginal site of recent occupation among coastal dunes near Eucla, a telegraph repeating station, now abandoned, situated where the eastern border of Western Australia meets the shore of the Great Australian Bight. The pieces had been buried under blown sand of the coastal dunes but were lying in such a position that evidently they formed, at one time, a compact parcel which for some reason had been abandoned. This fact and the semi-finished appearance of most of the flakes, together with their presence in that particular locality, indicated that the collection was a hoard or trade parcel which was in transit from the known flint sites on the coastal cliffs one day's journey to the East. These deposits, exposed by the weathering away of the cliff face of the Miocene limestone beds of the Nullarbor Plain, provide nodules of an excellent grade of flint in a fresh or "green" condition.

From the cultural point of view the Mirning, the present-day aborigines of the locality, are amongst the most primitive of the people in Australia, their habitat being about 750 miles south-westward beyond regions where edge-ground stone axes are made, and at least 500 miles away from areas where even "traded" axes of that kind have penetrated. As the find apparently represents a collection of material made during a flint knapper's expedition, it was expected that such an unique opportunity as was presented by these specimens would reveal interesting characteristics of the technique practised on flint material by a people living at what might be termed a palaeolithic-level of culture.

Here it is perhaps as well to emphasise that during the semi-developed stages of a stone industry the tools produced are, for several reasons, restricted to a few types which serve many purposes. Pieces, therefore, which we term "scrapers," "adzes," "points," etc., in this survey are only named as such for convenience and in order to conform to established classification. Two typical worked stone tools of the Eucla area, of types in use up to the present day are shown as fig. 1. They are made of similar flint to that found in the hoard. An example made of material similar to that of this hoard has been found 180 miles away to the north at Wardaruka (Boundary Dam), and other examples have been noted at Ooldea (200 miles east).

The notes below are the result of our preliminary analysis of the pieces. The accompanying diagrams, fig. 2, will serve, we hope, as a guide to the nomenclature employed.

Description

Viewed as a whole, the 74 specimens appear the product of knapping at least four nodules of flint—light brown, reddish brown, grey and blackish grey pieces

being distinguishable. Two of the pieces are "flake implements." There are no cores or coroid implements, and the parcel consists of flakes—a few reaching the "blade" category—but two specimens are actually more in the nature of blocks. A few pieces have been crackled by heat.

Twelve of the pieces are really large fragments, as they lack the platform and bulb end. One of these shows a certain amount of trimming at one end, approaching the shape of an "ogival" or nosed-scaper. Some of them are such as would be handy pieces mounted in gum for cutting purposes. Eight of the flakes show a certain amount of trimming on the platform. These last, as well as the two implements, will be referred to separately in more detail.

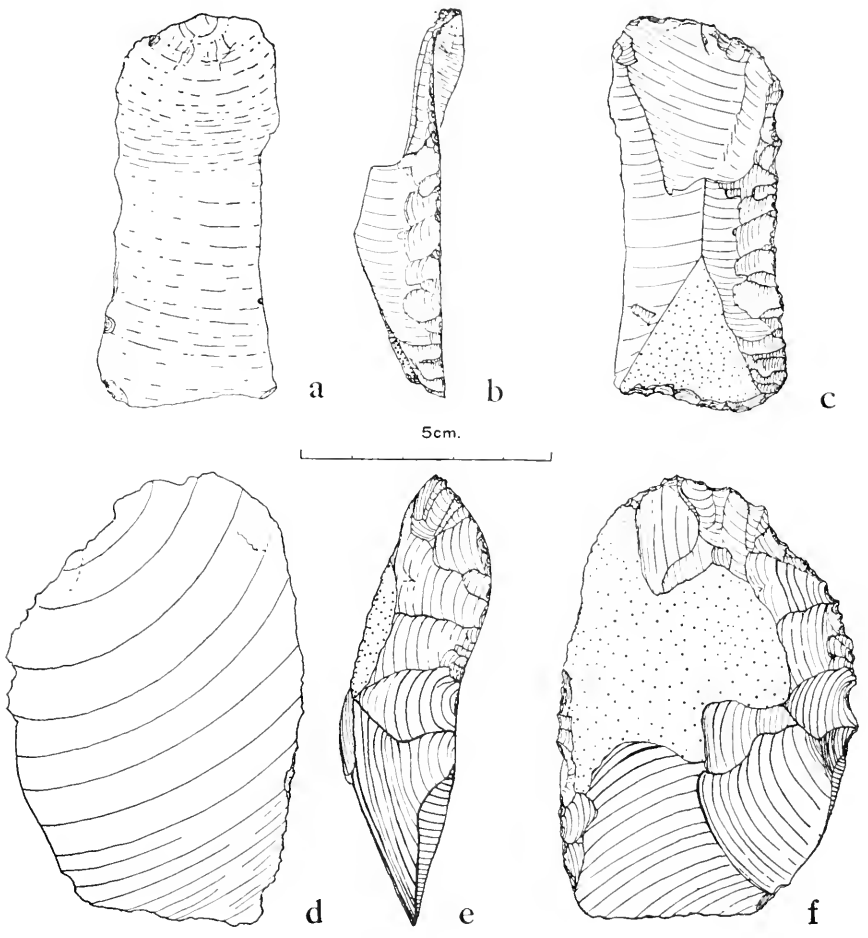

Fig. 1

a-c, flint implement from Eucla (A. 27550 in S.A. Museum);
d-f, ditto from hoard of knapped flint (A. 27556).

Flake Analysis

There are left 52 pieces which bear the platform intact, and are thus suitable material for analysis. Some 19 of this group show trimming, or squilling of sorts at one or other part of the margin, and a few of them may have been called into use or more likely touched up during the knapping operation, but they are included in this group to provide a more adequate sample for study, the

secondary attention not having been sufficient to obscure the characteristic major features of the flakes. There are, however, four specimens with smashed bulbs and seven pieces with snapped-off ends—as also one with heat-crackled tip—which are in consequence not included in some of the analyses.

Platform—A simple prepared, that is a flattened, platform was usually employed. There is only one instance of the impact spot being on the crust. Very little crushing of the comparatively brittle cortex has taken place. The bulb on this specimen is of the diffused form. On the other hand, some 13 flakes show bruising or pulverising at the impact spot, or at the intersection of the platform and bulb, *i.e.*, the bulb-top. Of the other 38 pieces, 22 show clean and unmarked platforms, and 16 bear small arc-shaped cracks at the impact spot, forming what may be described as a ghost, or incipient, cone (fig. 3a). There were no genuine examples of the platform with several facettes.

As regards the depth of the platform, *i.e.*, the distance between the inner face edge at the bulb-top and the outer face edge which is directly opposite, this reaches 1·6 cm. in one case whilst in one or two specimens it is too small for

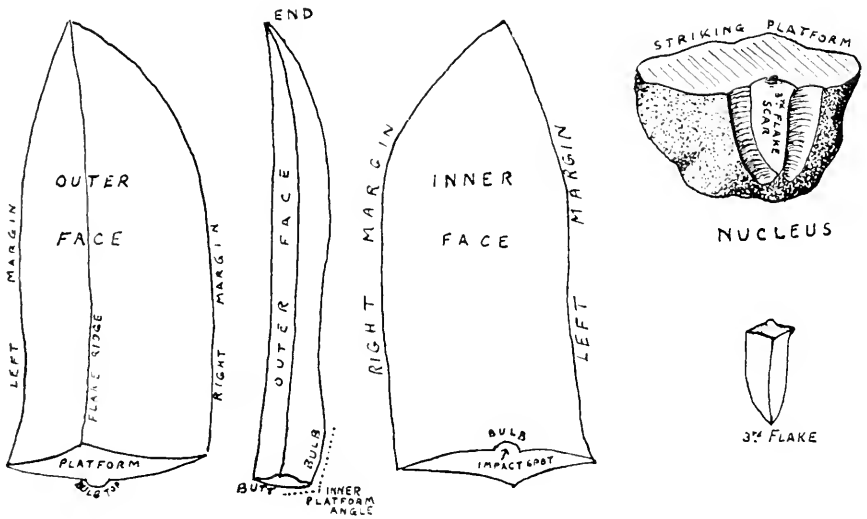

Fig. 2

Diagrams illustrating nomenclature employed.

ordinary measurement. A division showed 17 flakes with depth of platform at 5 mm. or under, and 35 at over 5 mm.

The above evidence suggests an absence of regular procedure as to the treatment and form of the platform, except that a plain (simple) levelled platform over 5 mm. in depth was more frequent.

Inner Platform Angle—Taking the angle between the plane of the platform at impact spot and the plane of the adjacent bulbar, or inner face, to a length of 2·5 cm., it was found that six pieces showed an angle below 100° (low), while 32 were from 100° to 115° (medium), and 10 above 115° (high), the highest being 125°. The deepest platform of 1·6 cm. mentioned above was at a low angle.

The evidence shows that, except for most of the work being done at an angle between 105° and 115°, the worker knapped off any angle within a range of some 35°, and had no particular rule.

Bulbs—It was found that the more or less curved edge which intersects the bulb and the platform, where the fracturing that separated the flake from the

nucleus commenced, was of large radius (diffused, fig. 3 b) on 21 pieces and of small radius (salient, fig. 3 c) on 27. These forms of bulb-top do not show any dependence on the angle of the platforms, as of 32 pieces of medium angle platform, 15 have diffused and 17 salient bulbs, while of the high angles three were diffused and seven were salient. The salient bulb is in a slight majority, nearly 60%, but is not characteristic of the worker.

Multiple Bulbs, etc.—Multiple bulbs occur in five pieces and are salient except in one case. Three pieces bear more of a pyramidal than a conic form of bulb.

Eraillures (chafed or scarred marks on bulb) are comparatively plentiful, being found clearly on 23 pieces.

Conchoidal ripples, as also fissures on the bulb, are not much in evidence.

Six of the pieces show checked (step, resolved) flake scars at the butt on the outer surface (fig. 3 e). These may be the result of ineffective blows due to clumsiness, irregularity of material or unfavourable surface contour.

Six flakes end with a hinge fracture.

Dimensions—The length of the flakes ranges from 3·5 cm. to 8·5 cm. The commonest lengths are, respectively, 5 cm., 7 cm. and 6 cm., and these three sizes comprise nearly 60% of the total number of complete flakes.

Measuring the greatest width of each piece the range is found to be 2·5 cm. to 7·5 cm., and the majority (nearly 60%) are between 3·5 and 5 cm. In this connection it should be borne in mind that we are here concerned with selected flakes, rejections having been left on the working site, and it must be assumed that the above show the dimensions of pieces thought suitable for tool production.

Secondary Working

Two pieces which are definite flake implements have been mentioned. One has a truncated isosceles triangular outline and the appearance of an end-scraper, the wings of which were the working edges. Its dimensions are 7·5 cm. long by 5·5 cm. at the scraper end. The narrower butt-end has been worked by long retouches, and the striking off of the platform and bulb has been done by one blow. Some rough white cortex occupies about one-fifth of the outer face.

The other implement (fig. 1 d-f) appears to be a form of large flake adze such as would be mounted axially in gum at the end of a wooden haft and is roughly a semi-disc in outline, being 9 cm. x 6 cm.. The marginal shaping and trimming has in its course removed the platform and most of the bulb. About one-third of the outer face retains the rough white cortex.

Both implements are made on stout flakes of dull brown flint, and in fact the material is so similar in texture that they appear to be off the same nucleus. The outstanding attention given to these implements, as if they were one of the main reasons for the knapping, coupled with the likelihood that they were derived from the same nucleus and the fact that they still retain a fair proportion of the nodule crust, warrants the deduction that their maker was a rapid and deft stone worker.

In addition to these two implements there are eight flakes which show more or less trimming of the platform (fig. 3 d), and these bear definite signs that this work was done after detaching the flake from the nucleus. In appearance they are somewhat similar to the "facetted butts" of Europe which are said to be the peculiar product of the "tortoise core." These eight flakes, however, cannot be thus explained, the facetting either being subsequent to, or, where the impact spot is plain and intact, independent of the knapping. We therefore view these pieces as (1) possibly providing a working edge which had been trimmed on the butt because of its suitable formation; or (2) as having been semi-trimmed about the

time of knapping with a view to making them into more definite tools when required.

The above 10 pieces show the secondary work and trimming to have been done by the removal of bold and well-placed shaping scales followed by chipping and a longish retouch. There are few signs of a "step" (or "checked") retouch having been employed, and none of the abrupt or the pressure trimming kind. It should not be overlooked, however, that the nature of the find is such as to imply that the pieces are incompletely finished material.

Discussion on Knapping Technique Employed

Thirty-four specimens of the flakes are found to be thinner at end than at butt, and taking into account the seven snapped pieces, as also six which end with a hinge fracture, a thin-ended flake may be taken as the usual result of this knapper's work. Twenty-one of the specimens show some form of median ridge on the outer face, but only 12 of these end in anything approaching a

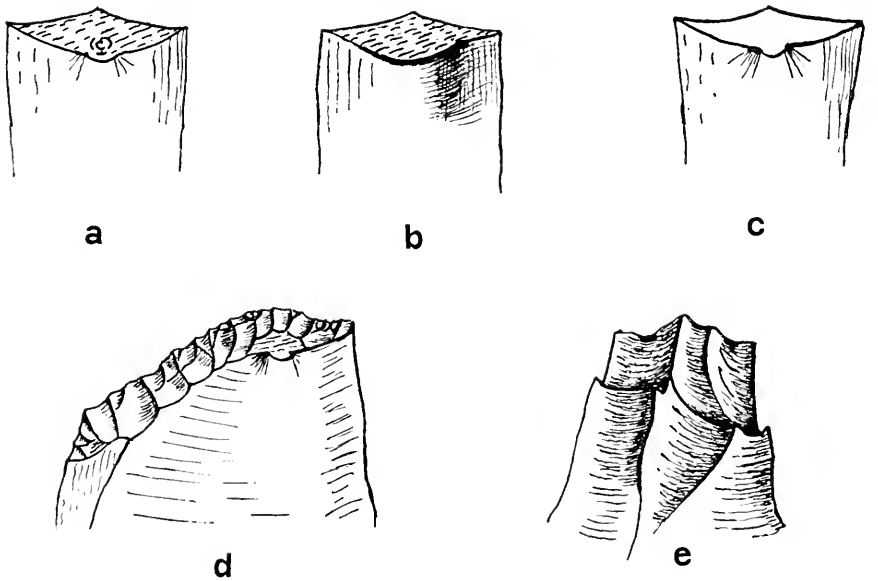

Fig. 3

Details of Specimens from Hoard
a, incipient or "ghost" cones; b, diffused bulb; c, salient bulb; d, subsequent trimming of platform, resembling "facetted butt"; e, checked flake scars at butt

point. Twenty-one other pieces bear more than one ridge and 10 have none at all. There would thus seem to have been no definite desire to make pointed flakes, and in this connection it may be mentioned that, except for a single specimen (*pirri*) of local material found on a Eucla site (which may be a relic of an earlier period), such implements as points are not now used in the Eucla territory. In regard to what is achievable with pointed flakes in the more advanced northern culture areas, it may not be out of place to mention that we have seen one magnificent single-ridged specimen from Wave Hill, North Australia. It is in a very pale rose quartzite of a length of 27 cm. (actually about 27·5 cm. as tip is broken off) of almost perfectly flat lanceolate shape and obtuse triangular transverse section, the width near butt being 6·3 cm. This is a triumph of Australian knapping, as no trimming was necessary to make the shape perfect. The inner platform angle is 110°. The source of the material from which such blades are made is known to be in the Katherine area of North Australia,

but the technique has not yet been studied. Motion picture studies of such workmanship as this, with, just as important, running commentaries by experienced eyewitnesses, as also of hammer-dressing, polishing, "pressure" denticulating edge, and each tribe's knapping technique are highly desirable. Australia's unique preservation of so many different methods of stone working will not last much longer.

Careful inspection of the direction of the knapping blows that detached the earlier flakes from each of the 52 pieces, as shown by the flake scars on the outer face, reveals that on 25 pieces all the blows were delivered from the same direction, whilst 26 bear scars showing that the blows were from more than one direction. One piece is all crust on the outer face.

The above facts would seem to show that the Eucla worker (or workers) did not aspire to the making of long flakes, but the 25 pieces each worked in the same direction not only imply an appreciation of a common platform but the realisation that a carefully shaped face on a nucleus, bearing the right ridges and contour, is the major essential to successful knapping. This is further borne out by the fact that most of the flakes are practically free of cortex, and that no less than 21 of the pieces show a median ridge. It is unfortunate that no nucleus is included in the hoard. Whilst the evidence of a repeatedly used prepared simple platform suggests that a sort of prismatic nucleus was eventually formed, the number of flakes with diversely produced ridges, assuming they do not all represent preliminary dressing, should mean the formation of globular or polyhedral cores also. The use of a common platform and the production of thin-ended flakes entails: (a) some dressing of the nuclear face; (b) simultaneous use of more than one platform on the nucleus; or (c) commencement of the work on a high-angled platform or conically dressed nucleus in order to counteract the consequent sub-pyramidal form that the nucleus assumes after several flakes have been removed.

Stone was probably used as the knapping and trimming tool. One cannot definitely say that comparatively soft material was not also employed. We expect that a granite pebble or a flint nodule was used, as these are the only kinds of suitable stone material available within a radius of 250 miles.

It will be noticed that we have not made use of the platform analyses in our above remarks. Our experience in experimental knapping, as also that gained by one of us of stone work done during his sojourns amongst the aboriginal tribes still using stone, has led us to believe that, provided the impact point on a nucleus of good material offers sufficient obstruction (a correctly delivered blow suitably placed being assumed), little else but a favourable range of angularity is required of the platform. The shape of the knapping tool at the spot where it comes into contact with the nucleus is apparently a more intimate influence on the nature of the fragment detached. The careful selecting of the exact portion of the hammer that is to come into contact with the nucleus immediately before the blow is struck is a noticeable characteristic of present-day aboriginal knapping. There is also a freedom from working restrictions which is also revealed by the analyses given above in regard to bulbs and platforms, and this exposes the minor part actually played by the platform. The major factor in knapping technique is shown to be the contour and ridging of the face of the nucleus from which the desired fragment is detached—together with the position of the point of impact in regard to same, these being the main controlling factors of block, flake or blade form.

Conclusions

We class the Eucla work in flint as that of a developed flake industry producing good flakes at the "incipient blade" stage, and we consider the parcel the product of one or more practised specialists, who could work on a platform angle range of 35°.

Simple flat platforms were prepared but no strict rule of detached platform angle was followed beyond 60% ranging between 105° to 115°, and as to platform size, except that it was usually over 5 mm. This contrasts with the finding of one of us (Tindale 1937) amongst Tasmanian implements, where the angle is usually over 110°, and commonly even 120° in the case of the most recent.

Preparation by decortication of the nodule was effected to produce a good nucleus. The face of the nucleus was prepared and a common platform utilised, though this higher technique was not improved to a full development. A salient bulb, 60%, and *craillures* are to some extent characteristic. Thin-ended flakes ranging from 5·0 to 7·0 cm. long by 3·5 to 5·0 cm. wide are to a slight extent, 60%, characteristic. It would seem that though not entirely dependent on secondary work to obtain the desired tool shape, its employment was still to a fair extent necessary to complete the tool. In trimming well-placed shaping scales were followed by finer chips and the long retouch. There are no signs of pressure trimming.

It may not be out of place here, in order that the workmanship of the hoard should be appreciated, to draw attention to the great irregularities, almost amounting to inconsistencies in some modern aborigines' treatment of stone for their requirements. Any random piece of suitable stone may at times be used without further treatment and, if at all trimmed, this may in some cases be actually done with the teeth. What might be described as professional work may be found alongside examples of very indifferent work in the same group, or even done by the same person. When a cutting chip of sorts is required, such as in the blood-letting ceremony, the procedure may be little more than hitting one stone with another and selecting from the sharpest fragments so obtained. A suitable piece with sharp edge, as knapped, is brought straight into use, and what might be scientifically classed as "secondary work" or "trimming" is actually re-edging. This re-edging, moreover, may be done with the teeth, stones, a spear-thrower, a throwing stick, or any other convenient article such as a hunting boomerang, if hard enough. As to the aboriginal use of the re-edged tool, the plain face used as the platform upon which is applied the re-edging blow or force, is invariably the face nearest to the material worked upon when chopping or scraping. Some favourite tools are so repeatedly re-edged that the working edge faces are at a marked obtuse angle, whilst a few others are so often used as to show a distinct polishing of the working edge. In one case, a pebble chopper (A. 28408) from a Murundian site, at Moana, South Australia, the obtuse angle shown by the faces forming the working edge, was as high as 140° when discarded.

Reference cited

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